

WOOD QUALITY OF THE SOUTHERN PINE RESOURCE

The Management, Utilization

and Economics of plantation grown trees

A TECHNOLOGY DEVELOPMENT AND TRANSFER PLAN

March, 1992

THIS TECHNOLOGY DEVELOPMENT AND TRANSFER PLAN WAS.....

PREPARED BY:

The Technology Dev. and Transfer Team

SUBMITTED BY:

C. B. Curtis Jr.

Team Coordinator

RECOMMENDED BY:

[Signature]
Director Cooperative Forestry, USDA Forest Service, Southern Region

APPROVED BY:

John E. Alcock
Regional Forester, USDA Forest Service, Southern Region

Peter J. Ransapala
Director, USDA Forest Service, Southeastern Forest Experiment Station

Thomas H. Ellis
Director, USDA Forest Service, Southern Forest Experiment Station

[Signature]
Director, USDA Forest Service, Forest Products Laboratory

[Signature] 11 May 92
Chairman, Southern Industrial Forest Research Council

James E. Neal 5 May 1992
Southern Regional Extension Forester

Introduction

Plantations currently comprise one-third of the pine forest area in the South, but contribute only about 15 percent of mill furnish in the region. By the year 2000, less than a decade away, the acreage of pine plantations will increase modestly, but will provide about 50 percent of the South's softwood fiber supplies. At the very least, this substantial shift in our resource base will require rapid technological and market adaptations. This Technology Development and Transfer Plan will deal with approaching issues associated with the changing resource base and will serve as a guide in initiating new research, conducting on-going research and transferring the developing technology to appropriate audiences.

The Issue

Fast growing southern pine plantations produce relatively high percentages of "juvenile" wood. Juvenile wood is produced near the center of the tree and is related to the number of rings from the pith, and proximity to the tree's crown when the wood is formed. In southern pine it usually consists of 5 to 15 growth rings. Plantation grown trees have greater amounts of juvenile wood than natural grown trees because they are planted at wide spacing and maintain larger crowns for a longer period of time. Thinnings from plantations younger than 15 years old have high percentages of juvenile wood which varies geographically. The tops of trees, from both plantation and natural stands, also contain high percentages of juvenile wood.

The anatomical, chemical and physical properties of juvenile wood are less desirable for most forest products. Juvenile wood has low specific gravity due to large diameter cells with thin cell walls, high moisture content, and a high percentage of earlywood. Within the cell wall, alpha-cellulose is organized in string-like structures called microfibrils. In mature wood, the microfibrils are oriented nearly parallel to the long axis of the fibers. However, in

juvenile wood their orientation is not parallel and angles up to 55 degrees may be formed. As the fibril angle increases, tensile strength in the long axis of the fiber decreases and longitudinal shrinking and swelling increase.

Juvenile wood has lower cellulose and higher lignin content than mature wood. However, cellulose content of juvenile wood is quite variable, ranging from 5.7 to 13.7 percent.

The major differences between juvenile wood and mature wood are strength, specific gravity, and moisture-related dimensional stability. These properties influence to a large degree the grade and quality of solid wood and composite products. Specific gravity is particularly important in pulp manufacture. Low specific gravity juvenile wood results in higher manufacturing costs.

The anticipated rapid changes in the resource base mandate immediate strategic planning and research. If the South is to retain its competitive advantage and its market share in the softwood-based industry, we must deal effectively with the impacts of increasing juvenile wood on wood quality. Management techniques, improved technologies, and expanded markets are needed to lessen these impacts.

Objectives

The goal of this "Technology Development and Transfer Plan" is to initiate activities that will minimize the impacts of juvenile wood on processors and merchants of forest products. To accomplish this goal, the following objectives will be the focus of this plan:

- (a) To provide support and assistance to Forest Service, University and Industrial Research organizations in the selection and promotion of juvenile wood research initiatives. Such initiatives may include silvicultural and management strategies to reduce juvenile wood content and processing techniques to increase utilization and enhance quality.
- (b) To transfer the technology resulting from juvenile wood research, through appropriately selected media, to targeted audiences.

The time frame for the accomplishment of this plan shall be 5 years. At the end of this time, an evaluation of research initiatives and applications and technology transfer activities will be utilized to determine the success of this effort.

Organization to achieve objectives

An Advisory Board of management level leaders of the forest products industry, associations, universities and government will oversee and guide the overall effort of this plan. Its main duties will be to direct the action plan of "The Technology Development and Transfer Team" and to provide advice, assistance, and research support.

A "Technology Development and Transfer Team" of 10 to 15 staff level workers representing the forest product industry, associations, universities, and government will be formed. They will develop and carry out a detailed action plan for needed research, schedule coordinating meetings to discuss the conduct of on-going research and transfer the resulting technology to appropriate audiences.

Members of the Advisory Board

Mr. Karl Brohammer	Director of Product Service Southeastern Lumber Manufacturers P. O. Box 1788 Forest Park, GA 30051
Dr. Harold E. Burkhardt	Acting Head, Dept. Forestry Virginia Tech. University 324 Cheatham Hall Blacksburg, VA 24061-0324
Mr. Warren G. Carson	Inland-Rome, Inc. P. O. Box 100 Coosa, GA 30129
Dr. L. Wayne Haines	International Paper Company Southlands Expt. Forest Route 1, Box 571 Bainbridge, GA 31717
Mr. Sam Hopkins	Gulf States Paper Corp. P. O. Box 3139 Tuscaloosa, AL 35404

Mr. J. Lynn Jonakin	Macmillan Bloedel, Inc. P. O. Box 336 Pine Hill, AL 36769
Mr. Wayne Lininger	Proctor & Gamble Cellulose Co. Rt. 3, Box 260 Perry, FL 32347
Mr. James E. Loy	Director, Lumber Division Southern Pine Inspection Bureau 4709 Scenic Hwy. Pensacola, FL 32504
Mr. H. M. "Mac" Lupold	Manager, Manufacturing Services Wood Products Federal Paper Board Company, Inc. P. O. Box 8 Riegelwood, NC 28456
Ms. Catherine M. Marx	Engineered Systems Manager Southern Forest Products Assoc. Box 52468 New Orleans, LA 70152
Mr. James E. Neal	Cooperative Extension Service Southern Region University of Georgia Hoke Smith Building Athens, GA 30602
Dr. Kenneth R. Peterson	USDA Forest Service Forest Products Laboratory One Gifford Pinchot Drive Madison, WI 53705-2398

Members of The Technology Development and Transfer Team

Dr. Clark Baldwin	USDA Forest Service Alexandria Forestry Center 2500 Shreveport Highway Pineville, LA 71360
Dr. Jim Barnett	USDA Forest Service Alexandria Forestry Center 2500 Shreveport Hwy. Pineville, LA 71360
Dr. Julian R. Beckwith III	Agriculture & Natural Resource Cooperative Extension Service Barrow Hall Athens, GA 30602

Mr. Alexander Clark III

Southeastern Forest Experiment Station
USDA Forest Service
Forestry Sciences Laboratory
Green Street
Athens, GA 30602

Mr. A. B. Curtis, Jr.

USDA Forest Service
S&PF Cooperative Forestry
100 W. Capitol Street
Jackson, MS 39269

Mr. Phil Dunham

Timberlands Division-Forest Research
Westvaco
Box 1950
Summerville, SC 29484

Mr. David Kretschmann

Forest Products Laboratory
USDA Forest Service
One Gifford Pinchot Drive
Madison, WI 53705-2398

Dr. Robert H. McAlister

Southeastern Forest Experiment Station
USDA Forest Service
Forestry Sciences Laboratory
Green Street
Athens, GA 30602

Dr. Robert C. Purnell

Forest Productivity and Research
International Paper Company
Route 1, Box 421
Bainbridge, GA 31717

Mr. Joe Saucier

Southeastern Forest Experiment Station
USDA Forest Service
Forestry Sciences Laboratory
Green Street
Athens, GA 30602

Dr. Hank Stelzer

Proctor and Gamble Cellulose Corporation
Route 3, Box 260
Perry, FL 32347

Dr. Bryce J. Stokes

Southern Forest Experiment Station
USDA Forest Service
G. W. Andrews Forestry Sciences Lab.
Devall Street
Auburn University, AL 36849

Audiences

- (a) Industry executives
- (b) Trade Associations
- (c) Plant managers

- (d) Woodlands Managers
- (e) Foresters
- (f) Landowners
- (g) Technology transfer professionals
- (h) Researchers
- (i) Selected Government Agencies
- (j) General public

Media

- (a) Group presentations, e.g. conferences, workshops, training sessions, speeches
- (b) Publications e.g. technical journal articles, brochures, leaflets, magazine articles
- (c) Radio and TV
- (d) Newspaper features and releases
- (e) Slide, slide/tape and video programs
- (f) Displays at point of sale: building material dealers, etc.
- (g) Direct Mail
- (h) Tours

Costs

Salary and travel expenses for Members of the Board and Members of The Technology Development and Transfer Team that will implement this plan are assumed to be provided by their agency or company. Costs shown in the action plan are estimated to be the needed expenditures beyond salary and travel.

Evaluation

Periodic evaluations shall be made at the discretion of the Advisory Board.

ACTION PLAN

TASK	AUDI- ENCE	PERSONS RESPONSIBLE	TARGET DATE	COST	ACCOMP. DATE
(1) Complete a comprehensive literature review (including a report) of current and past research on the formation, management and utilization of plantation southern pine as it relates to wood quality to include:					
(a) Anatomical and chemical properties	d,e,f, g,h	J. Beckwith, M. Gibson	Dec.92	1000	
(b) Biology and management	d,e,f, g,h	B. Purnell, C. Baldwin, J. Barnett A. Clark	Dec.92	1000	
(c) Physical and mechanical properties of solid wood and composites	c,d,e, f,g,h	D. Kretchman, B. McAlister, T. Faust, J. Saucier	Dec.92	1000	
(d) Economic impact of plantation grown wood	All	F. Cubbage, A. Curtis	Dec.92	1000	
(2) Hold a workshop on juvenile wood research progress and needs.	a,g,h, i	A. Curtis, Team	Jan.93	2000	
(a) Review reports described in item 1 above and identify priority research needs.		Advisory Board	May 93		
(b) Prepare and publish a comprehensive paper on juvenile wood and priority research needs		J. Saucier, A. Curtis Team	June 93	4000	
(c) Publish a brochure detailing priority research		Advisory Board	Sept.93	1000	
(d) Publish a brief informational brochure based on the comprehensive report.		A. Curtis	Sept.93	2000	

ACTION PLAN

TASK	AUDI- ENCE	PERSONS RESPONSIBLE	TARGET DATE	COST	ACCOMP. DATE
(3) Identify suitable study sites including timber stands and processing systems for conducting priority research.	h	C.Baldwin, H. Burkhart, Team	Aug.93 & on-going	3000	
(4) Conduct an annual evaluation of current juvenile wood research and adjust priority needs.	h	Advisory Board	Feb.94	1000	
(5) Revise and update TT plan based on Advisory Board's review and adjusted priority needs.	h	A.Curtis, Team	Mar.94		

ACTION PLAN

TASK	AUDI- ENCE	PERSONS RESPONSIBLE	TARGET DATE	COST	ACCOMP. DATE

ACTION PLAN

TASK	AUDI- ENCE	PERSONS RESPONSIBLE	TARGET DATE	COST	ACCOMP. DATE